AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523

BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY

Batch #22

1. SUBJECT CLASSIFICATION

A. PRIMARY: Agriculture — AM40-0000-0000

B. SECONDARY: Aquatic biology

2. TITLE AND SUBTITLE

Phenology of midges in experimental ponds

3. AUTHOR(S)

Dendy, J.S.

4. DOCUMENT DATE	5. NUMBER OF PAGES	6. ARC NUMBER
1971	6p.	ARC

7. REFERENCE ORGANIZATION NAME AND ADDRESS

Auburn

8. SUPPLEMENTARY NOTES *(Sponsoring Organization, Publishers, Availability)*

(In Canadian entomologist,v.103,no.3,p.376-380)

9. ABSTRACT

10. CONTROL NUMBER

PN-RAB-354

11. PRICE OF DOCUMENT

12. DESCRIPTORS

Diptera
Phenology
Ponds

13. PROJECT NUMBER

14. CONTRACT NUMBER

CSD-2780 211(d)

15. TYPE OF DOCUMENT

AID 590-1 (4-74)

PHENOLOGY OF MIDGES IN EXPERIMENTAL PONDS

J. S. Dendy

Agricultural Experiment Station, Auburn University, Auburn, Alabama

Reprinted from the Proceedings of the 4th International Symposium on Chironomidae, The Canadian Entomologist, 103(3): 376-380, March, 1971.

PHENOLOGY OF MIDGES IN EXPERIMENTAL PONDS[1]

J. S. DENDY

Agricultural Experiment Station, Auburn University, Auburn, Alabama

Can. Ent. 103: 376-380 (1971)

Abstract

Adult midges (Chironomidae: Diptera) were recorded at experimental ponds during all months. Data from 13 years were combined by months. Submerged traps yielded 50 species. Other methods of collecting obtained 15 additional species. Traps in 12 similar 0.1-ha ponds beside a permanent slow-flowing supply-canal yielded 45 species. Traps in a 1.95-ha pond that lacked such a canal yielded 15 species.

Introduction

The presence of adult chironomids at fish ponds may be taken for granted, but since this stage is responsible for reproduction and dispersal, the presence of certain species has more than casual importance in the ecology of a pond. This paper presents a summary of information regarding emergence of chironomids from experimental fish ponds. It lists emergences by species and months, and species of midges that emerged from two different types of ponds.

Review of Literature

The paper on chironomids of Alabama by Dendy and Sublette (1959) reported numerous dates of collections that are included here. The account of the life history of *Tendipes* (*Tendipes*) *crassicaudatus* (Malloch) given by Sublette and Dendy (1957) recorded that at this latitude this species has been observed to emerge during most months of the year. Sublette (1964) includes descriptions of some important species in ponds at Auburn, and some phenology was extracted from his records. Buckley and

[1]This study was supported by Projects Nos. Hatch 425 and 254.

Sublette (1964) present phenological data some of which are strikingly similar to and some strikingly different from data from Auburn ponds depending on species involved. The literature used in identifying species was chiefly Townes (1945), Johannsen and Townes (1952), Malloch (1915), and Darby (1962).

Materials and Methods

The ponds involved in this study were in the Fisheries Research Unit of the Auburn University Agricultural Experiment Station, Auburn, Ala., near position 32°38′ N., 85°29′ W. The area is approximately 270 km (165 miles) from the Gulf of Mexico. The winters were mild and, although sub-freezing weather occurred occasionally, ice on ponds was of brief duration. In one area there were several hundred ponds located quite near each other, some earthen, some concrete, and others plastic. The largest of these were the 0.1-ha (0.25 acre) "F" ponds. They were 60.9×16.6 m (200×54.5 ft), approximately 0.6 m (2 ft) deep at the shallow end, and 1.4 m (5 ft) deep at the drain pipe. The bottoms were sandy clay at the margins and fine silt on the gentle slopes toward the deep ends. Approximately 3.2 km (2 mi) away there were 28 larger ponds. Of these S-1 had an area of 9.1 ha (22.5 ac) and S-28 an area of 1.95 ha (4.82 ac). Both of these ponds were irregular in shape and had a maximum depth of approximately 4.25 m (14 ft). Pond S-28 contained much woody brush in the middle, while S-1 contained only a few stumps of trees, and F ponds contained various amounts of rough pine boards to furnish solid substrate for attachment of fish food organisms (Pardue 1969). Pond S-28 was one of several storage ponds to supply water to the F ponds and other small ponds as needed, especially during draining and refilling.

The F ponds were constructed in 1941. They were drained and restocked almost every year and sometimes more than once per year. They were in fertilization experiments. Pond S-28 was constructed in 1957 and was drained and refilled in 1957, '58, '59, '61, '62, '64, '66, and '69. It was usually in short-term fish culture experiments. After each draining the ponds were treated with rotenone to eliminate undesired fish prior to restocking.

The most intensive collecting was done with submerged funnel traps, similar to those described by Sublette and Dendy (1959), during 1966 through 1968. Other collections were made at lights, with sweep nets, in cars, and on buildings. Some rearing was done, and some midges emerged from colonies of bryzoans, *Plumatella repens*, obtained from ponds. Traps in F ponds in 1966 and 1967 were located two near the middle and two at the deep end in each of 12 ponds. Traps were set in the afternoon and lifted the following morning. In S-28, in 1967 and 1968, three traps were set over each of six stations where depths were 0.6, 1.2, 1.8, 2.4, 3.0, and 3.65 m (2, 4, 6, 8, 10, and 12 ft) respectively. Nomenclature for species followed the recommendation of Dr. James E. Sublette (pers. comm.).

Phenology

Table I presents records of emergence of adult chironomids by months regardless of year. These records include data from 13 years of collecting. Presence of adults of a certain species in a trap was recorded by "X" under the appropriate month. Traps yielded 50 species. Collections at lights, in cars, in nets, etc. could not be related to certain ponds. Fifteen species represented only in these collections were recorded by use of "*". Adult midges were relatively scarce during December, January, and February. During these months they were active only during warmer weather.

Calopsectra dendyi and *Psilotanypus bellus* were represented in traps each month March through October. Specimens of *Chironomus attenuatus* group, *Cryptotendipes emorsus, Dicrotendipes nervosus*, and *Calopsectra xantha* were in traps during each of 7 months. Johnson and Munger (1930) and Mundie (1967) reported that *Chironomus plumosus* had an early and a late period of emergence separated by a period without emergences. A comparable pattern of emergence for this species is indicated in Table I. Data for several other species indicate discontinuous periods of emergence.

Table 1. Emergence of adult chironomids by species and months in experimental ponds, Auburn, Ala. Positive relations to dates and ponds (F, F ponds; S, pond S-28) obtained by collections in traps are recorded by "x". Additional data collected in various ways are indicated by*

	Pond	J	F	M	A	M	J	J	A	S	O	N	D
CHIRONOMIDAE													
TANYPODINAE													
Clinotanypus caliginosus (Johannsen)	S				x								
Coelotanypus concinnus (Coquillett)							*	*					
Labrundinia pilosella (Loew)									*				
Ablabesmyia aequifasciata (Dendy & Sublette)							*						
A. americana Fittkau	F					x							
A. basalis (Walley)							*						
A. illinoensis (Malloch)	F				x			x					
A. ramphe Sublette	F							x					
Procladius denticulatus Sublette	F			x	*	x	*				x		
Psilotanypus riparius (Malloch)	S			x									
P. adumbratus (Johannsen)	F		x										
P. bellus (Loew)	F S			x	x	x	x	x	x	x	x		
Tanypus sp.	F				x		*	x					
Tanypus carinatus Sublette	F S									x			
DIAMESINAE													
Diamesa sp.	F						x						
ORTHOCLADINAE													
Nanocladius alternantherae Dendy & Sublette					*		*						
Orthocladius sp.	F			x									
Cricotopus spp.	F	x					x				x		
Psectrocladius vernalis (Malloch)					*								
Trissociadius n. sp.	F		x										
Limnophyes n. sp.	S			x									
CHIRONOMINAE													
Chironomus attenuatus Walker group	F S	*	*	x	x		*			x		x	*
C. brunneipennis Johannsen	F S							x	x	x			
C. crassicaudatus Malloch	F					*	x	x	*	x	x		
C. plumosus (Linnaeus)	F S		*	x	*				*	x	x		
C. riparius Meigen group	F	x											
C. staegeri Lundbeck	F		x	*				x			x		
Goeldichironomus holoprasinus (Goeldi)	F					x			*	*	*		
Cryptochironomus blarina (Townes)	F			x				x		x			
C. fulvus Johannsen	F				x		*	x		x	x		
Parachironomus carinatus (Townes)	F				x						x		
P. directus (Dendy & Sublette)	F				x					*	*		
P. monochromus (Wulp)	F	*				*	*	x	x	*	*		
P. tenuicaudatus (Malloch)		*						*			*		
Cryptotendipes emorsus (Townes)	F			x	x	x	x	x	x	x			
Harnischia edwardsi (Kruseman)	F									x			
H. galeator Townes	F					x							
H. viridulus (Linnaeus)	F							x		x	x		
Dicrotendipes modestus (Say)	F		x	x			*	x	*		*		
D. nervosus (Staeger)	F S	*		x	x		x	x	x	x	x		
Demeijerea atrimanus (Coquillett)										*			
D. brachialis (Coquillett)								*				*	
Endochironomus nigricans (Johannsen)	F	*		x	*			x					*
G. meridionalis Dendy & Sublette	F S			x	x	*	*	x	x	x	x		
G. paripes (Edwards)	F			*		*		x	*	x	*		
Lauterborniella varipennis (Coquillett)	F									x			
Paralauterborniella elachista (Townes)	F						x						
Paratendipes sp.					*	*							
Polypedilum digitifer (Townes)	F S				x		*	x		x	*		
P. halterale (Coquillett)	F S						x	x	*	x			
P. illinoense (Malloch)			*	*						*			
P. simulans Townes	F						*		*	*	x		
P. trigonus Townes								*					

Table I. (*Concluded*)

	Pond	J	F	M	A	M	J	J	A	S	O	N	D
Pedionomus beckae Sublette												•	
Stenochironomus hilaris (Walker)	S				x								
Micropsectra dubia (Malloch)				•	•								
Calopsectra confusa (Malloch)			•	•			•						
C. dendyi (Sublette)	F S			x	x	x	x	x	x	x	x		
C. neoflavella (Malloch)	F			x	x		x					•	
C. xantha (Sublette)	F S			x	x	x	x	x	x	x			
C. n. sp.	F		x										
Tanytarsus buckleyi Sublette	F						x	x		x			
T. quadratus Sublette	F			x	x	x							
T. recens Sublette	F			x		x							
Cladotanytarsus viridiventris (Malloch)	F			x									

In many collections from the larger ponds *Glyptotendipes meridionalis* made up the greatest biomass. In F ponds as well as S ponds two small species, *Psilotanypus bellus* and *Calopsectra dendyi*, were numerically dominant. A high degree of consistency regarding recolonization of ponds following draining and refilling was not encountered. For example, the 9.1-ha (22.5-ac) pond, S-1, was drained 1 September 1955, and by 14 February 1956, was full. Fertilization and other treatments of the pond were essentially the same as those received by other similar ponds. However, on 13 June, adults of *Chironomus crassicaudatus* were found in abundance. They continued to dominate the population of emerging chironomids from pond S-1 throughout much of the summer. Neither that pond nor any other had such a population of *C. crassicaudatus* during other years of this study, although this species was common both in large and small ponds.

In Table I the letters "F" and "S" in the column under "Ponds" indicate the presence of species in traps in F ponds or S-28 respectively. It was of interest that adults of 45 species were in traps in F ponds, while traps in S-28 contained only 15 species.

Traps in S-28 contained four species not represented in traps in F ponds, while traps in F ponds contained 35 species not captured in S-28. The slow-flowing canal that supplied water to the small ponds was not studied. Although water that passed from the canal to F ponds was screened to keep out unwanted fish, small chironomid larvae were able to crawl through the meshes of the screen. Since the canal was not subject to being drained and was not fertilized there is a strong probability that some species in F ponds came from the canal. In contrast, pond S-28 was located high on the watershed and its sources of water were rain, seepage, intermittent streams, and surface runoff.

References

Buckley, B. R. and J. E. Sublette. 1964. Chironomidae (Diptera) of Louisiana. II: The limnology of the upper part of Cane River Lake, Natchitoches Parish, Louisiana, with particular reference to the emergence of Chironomidae. *Tulane Stud. Zool.* **11**(4): 151–166.

Darby, R. E. 1962. Midges associated with California rice fields, with special reference to their ecology (Diptera: Chironomidae). *Hilgardia* **32**(1): 1–206.

Dendy, J. S. and J. E. Sublette. 1959. The Chironomidae (= Tendipedidae: Diptera) of Alabama with descriptions of six new species. *Ann. ent. Soc. Am.* **52**(5): 506–519.

Johannsen, O. A. and H. K. Townes. 1952. Guide to the insects of Connecticut. Part VI: The Diptera or true flies. Fifth Fascicle: Midges and gnats. Tendipedidae (Chironomidae). *Bull. Conn. Geol. nat. Hist. Surv.*, No. 80, i–vii and 3–147.

Johnson, M. S. and F. Munger. 1930. Observations on excessive abundance of the midge *Chironomus plumosus* at Lake Pepin. *Ecology* **11**(1): 110–126.

Malloch, J. R. 1915. The Chironomidae, or midges, of Illinois, with particular reference to the species occurring in the Illinois River. *Bull. Ill. nat. Hist. Surv.* **10** (art. 5): 275–543, pl. 17–40.

Mundie, J. H. 1957. The ecology of Chironomidae in storage reservoirs. *Trans. R. ent. Soc. Lond.* **109**. Part 5: 149–232, 36 figs.

Pardue, G. B. 1969. Production responses of fish to added attachment surface for fish-food organisms. Doctoral Dissertation, Auburn Univ. 66 pp.

Sublette, J. E. 1964. Chironomidae (Diptera) of Louisiana. I: Systematics and immature stages of some lentic chironomids of west-central Louisiana. *Tulane Stud. Zool.* **11**(4): 109–150.

Sublette, J. E., and J. S. Dendy. 1957. The immature stages of *Tendipes* (*Tendipes*) *crassicaudatus* (Malloch) (Tendipedidae: Diptera) with notes on life history and ecology. *J. Kans. ent. Soc.* **30**(4): 121–124.

——— 1959. Plastic materials for simplified tent and funnel traps. *SWest. Nat.* **3**: 220–223.

Townes Jr., H. K. 1945. The Nearctic species of Tendipedini (Diptera, Tendipedidae (= Chironomidae)). *Am. Midl. Nat.* **34**(1): 1–206.